ISSN (print) 0093-4666 © 2012. Mycotaxon, Ltd. ISSN (online) 2154-8889

MYCOTAXON

http://dx.doi.org/10.5248/120.35

Volume 120, pp. 35–41 *April–June 2012*

A new species of *Inonotus* (*Hymenochaetaceae*) and *Trametes cingulata* (*Polyporaceae*) newly recorded from Brazil

Maira Cortellini Abrahão* & Adriana de Mello Gugliotta

Instituto de Botânica, Núcleo de Pesquisa em Micologia
Caixa Postal 68041, CEP 04045-972, São Paulo, SP, Brazil

* Correspondence to : *mairaabrahao@hotmail.com*

Abstract — Two interesting species found during a survey of polypore fungi in northwestern São Paulo State, Southeast Brazil, are described and illustrated. *Inonotus multisetifer* is proposed as a new species characterized by resupinate basidiomata with round to angular pores, 6–9 per mm, acute setal hyphae embedded in trama, subulate hymenial setae, and globose to subglobose basidiospores. *Trametes cingulata* constitutes a first record from Brazil.

Key words — mycodiversity, neotropics, *Polyporales*, *Hymenochaetales*

Introduction

The Atlantic Rain Forest, which has 20,000 species of plants of which 6000 are endemic, holds today less than 8% of its original extent in Brazil and has been rated as one the world's top five biological hotspots (Mittermeier et al. 1999, SOS Mata Atlântica/INPE 2009).

The state of São Paulo is located in southeastern Brazil and has an area of 248,808.8 km^2. Mostly inserted in the Atlantic Forest domain (68%), the state contains remnants of rain forest, *Araucaria* forest, seasonal semideciduous forest, transitions between them, and remnants of vegetation of restinga and mangrove (Kronka 2005, SOS Mata Atlântica/INPE 2009).

Currently, the natural vegetation cover of the state amounts to only 13.94% of its surface (Kronka 2005, Nalon et al. 2008), concentrated mainly along the coastal zone, where there is a concentration of natural areas of Integral Protection (Xavier et al. 2008). In the northwest region, only minor conservation units are found (Kronka 2005, Xavier et al. 2008), with the majority of the remaining forest located in private areas where their conservation is key to biodiversity conservation in the State.

The mycodiversity in northwest São Paulo State is almost unknown; currently, only 36 species of basidiomycetes have been cited from this region (Xavier-Santos 2003, Abrahão et al. 2008, 2009).

As part of a wider project dealing with biodiversity of remnant forest fragments of the northwest region of São Paulo State, this study reports a new species of *Inonotus* and a new record of *Trametes cingulata* from Brazil, including descriptions, illustrations, and discussions on the species.

Materials & methods

Collections were performed between March 2007 and December 2008 in Semidecidual Stacional Forest fragments in northwest São Paulo State, Brazil.

The material was studied following the classical methods for polypores (Gilbertson & Ryvarden 1986, Ryvarden 1991, 2004). Micromorphological observations were made from material mounted in 5% KOH and Melzer's reagent; measures were made in 5% KOH in a Leica DM 1000 microscope.

Vouchers are deposited in SP, SJRP, and O (acronyms follow Holmgren & Holmgren 1998).

Nomenclature and classification systems follow those of Kirk et al. (2008), Centraalbureau voor Schimmelcultures (www.cbs.knaw.nl), and Index Fungorum (www.indexfungorum.org).

Taxonomy

Inonotus multisetifer Abrahão & Gugliotta, **sp. nov.** Figs 1–4

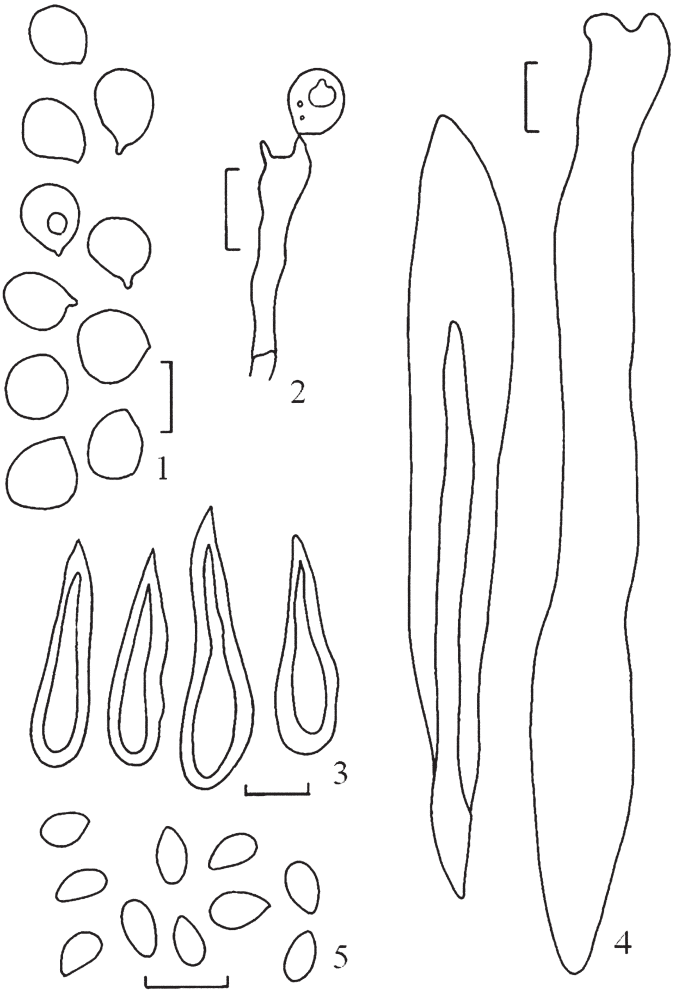
MycoBank MB 563746

Differs from *Inonotus adnatus* in larger basidiomata, slightly narrower setal hyphae, smaller scant hymenial setae, and larger (8.8–11.2 × 8.8–10 µm) globose to subglobose basidiospores.

Type: BRAZIL. São Paulo State: São João de Iracema, São Francisco Farm, G5 area (20°28′25″S 50°17′36″W), 17.IV.2007, M.C. Abrahão 270 (**holotype**, SP393791; **isotype**, SJRP).

Etymology: Referring to the abundant setal hyphae.

Basidioma annual, resupinate, up to 8 cm in diameter, ca. 4 mm thick, strongly adnate, hard and dense when dry. Margin thin to absent. Pore surface ochraceous to brown, pores round to angular, 6–9 per mm, invisible to the naked eye; tubes dark brown, up to 4 mm deep. Context homogeneous, very thin, virtually absent in parts, cinnamon. Hyphal system monomitic, IKI–; generative hyphae simple-septate, thin to thick-walled, golden to rusty brown, (2.5–)3.75 µm wide. Setal hyphae abundantly present, dark brown, acute, thick-walled, 100–200 × 8.75–16.25 µm, embedded in trama and not projecting. Hymenial setae scant and in some sections totally absent, apparently found only in the young pores and in the pores mouths, dark brown, subulate, thick-walled, 33.75–45 × 8.75–10 µm. Basidia clavate, hyaline, with four sterigmata,



Figures 1–5 (scale bars = 10 μm). Figs. 1–4: *Inonotus multisetifer* (SP393791, holotype) — 1, basidiospores; 2, basidia and immature basidiospore; 3, hymenial setae; 4, setal hyphae. Fig. 5. *Trametes cingulata* (SP416154) — basidiospores.

22.5–23.75 × 5–6.25 μm. Basidiospores globose to subglobose, IKI–, slightly thick-walled, hyaline to pale yellow, 8.75–11.25 × 8.75–10 μm.

Substrate & distribution —dead hardwood; known only from the type locality in Brazil.

Additional specimens examined —***Inonotus adnatus***: **COSTA RICA**. **Puntarenas**: La Amistad Pacifico, Estacion Progreso, near the station, alt 1180 m, 27.IX.2000, L. Ryvarden 42795 (O316222-079, isotype). ***Inonotus micantissimus***: **BRAZIL**. **Rio Grande do Sul State**: São Salvador, III.1944, S.J. Rick 20691 (PACA8878, holotype). ***Inonotus pegleri***: **TANZANIA**. **Eastern Province**: Kilosa District, Mikumi National Park, on dead fallen tree, alt 487 m, 30.IV.1968, D.N. Pegler T725 (K167869, holotype; O296, isotype).

Comments — *Inonotus multisetifer* is characterized by resupinate basidiomata, presence of acute setal hyphae in the trama, scant subulate hymenial setae, and globose to subglobose slightly thick-walled hyaline to pale yellow basidiospores. This combination of characters relate this species to other *Inonotus* resupinate species that also have setal hyphae, hymenial setae, and basidiospores varying from globose, subglobose to ellipsoid: *I. adnatus* Ryvarden, *I. micantissimus* (Rick) Rajchenb., and *I. pegleri* Ryvarden. The main diagnostic characteristics are shown in Table 1.

Table 1. Key features of *Inonotus multisetifer* and morphologically related species.

	I. multisetifer	*I. adnatus*	*I. micantissimus*	*I. pegleri*
Basidioma (thickness)	≤ 8 cm diam. (~4 mm)	≤ 4 cm diam. (~3 mm)	10 × 4 cm (≤14 mm)	12 cm (≤ 15 mm)
Pores/mm	6–9	6–9(–10)	5–6	4–6
Generative hyphae: walls; color	Thin to thick; golden to rusty brown	Thin to thick; golden to rusty brown	Slightly thick; yellowish to chestnut	Thin to thick; hyaline to light-brown
Hymenial setae (µm)	33.8–45 × 8.8–10	26.2–56.2 × 10–12.5	22.5–27.5 × 6.2–11.2	20–21.2 × 6.2–8.8
Setal hyphae (µm)	100–200 × 8.8–16.2	≤ 150 × 8.8–17.5	160–300(–400) × 8.8–20*	125–520 × 7.5–21.2
Basidiospore shape; color	(Sub)globose; hyaline to yellowish	Globose; yellowish	(Sub)globose, (apiculate); hyaline to pale melleous	Globose; hyaline to yellowish
Basidiospore size (µm)	8.8–11.2 × 8.8–10	7–8.8 diam.	11.25 × 8.8–10	6–7 µm wide

*(width up to 25 µm in KOH)

Inonotus multisetifer is morphologically most closely related to *I. adnatus*, a species known only from the type locality in Costa Rica (Ryvarden 2002, 2004, 2005). *Inonotus adnatus* presents a smaller basidioma, slightly wider setal hyphae, larger and ventricose hymenial setae, and smaller globose basidiospores. Hymenial setae are abundant in the type specimen of *I. adnatus* but scant to mostly absent in *I. multisetifer*.

Inonotus micantissimus, which also occurs in Brazil (Rajchenberg 1987, Baltazar et al. 2010), has larger pores, longer setal hyphae, smaller hymenial setae, and basidiospores with abundant oily contents.

Inonotus pegleri is easily separated by the combination of larger pores, smaller hymenial setae, longer setal hyphae, smaller basidiospores, and its limited distribution in Africa (Ryvarden 2005).

Trametes cingulata Berk., Hooker's J. Bot. Kew Gard. Misc. 6: 164, 1854 Fig. 5

Basidioma annual, lignicolous, sessile pileate to pseudostipitate, dimidiate, many basidiomata from one stipe or solitary; pileus semicircular, applanate and thinner near the margin, with contracted base, soft when fresh and flexible when dry, 0.7–4.6 × 0.7–3.9 × 0.1–0.8 cm. Pilear surface in brown and cream tints, concentrically zonate, glabrous. Margin round, concolorous with the pilear surface, entire, glabrous and sterile. Stipe when present circular, cream to brown, glabrous, dense, 0.2–1.1 × 0.2–0.9 × 0.5–1.3 cm. Pore surface poroid, lighter than pilear surface, pores angular to elongated, 7–9 per mm; tubes stratified, forming up to 4 distinct layers, light-brown, up to 2 mm deep; dissepiments thin to slightly thick, lacerate. Context duplex, the upper layer fibrous, greyish to blackish, thin, at least at the base separated by a thin black line from the lower part, the latter light-brown, corky, up to 6 mm thick at the base, negative reaction in KOH. Hyphal system trimitic, IKI–; generative hyphae hyaline, with clamps, thick-walled, 2.5–3.75 µm wide; skeletal hyphae yellowish, thick-walled, abundant in the basidioma, golden and solid in the context, 3.75–6.25 µm wide; binding hyphae hyaline to yellow, thick-walled to semisolid in the context, slightly irregular and moderately branched, frequent, 1.25–3.75 µm wide. Cystidia absent. Basidia clavate, hyaline, thin-walled, 11.25–12.5 × 3.75–5 µm. Basidiospores obovoid, hyaline, IKI–, smooth, thin-walled, 5–6.25 × (2.5–)3.75 µm.

Substrate & distribution — causing white-rot in twigs of dead angiosperm. Previously cited from Asia, Africa, and Australia (Ryvarden & Johansen 1980, Young et al. 2004, Gilbert et al. 2008) and Costa Rica and Venezuela in America (Ryvarden & Iturriaga 2001, Mata et al. 2007).

Material examined — **BRAZIL. São Paulo State**: Palestina, Boa Vista Farm, P6 area (20°19′16″S 49°30′17″W), 10.XII.2008, A.M. Gugliotta 1410 (SP416154, SJRP); São João de Iracema, São Francisco Farm, G5 area (20°28′25″S 50°17′36″W), 27.XI.2007, M.C. Abrahão 319 (SP393683). **INDIA**. **Behar**: Soane River [**Bihar**: Son River], on dead wood, J. Hooker s.n. (K167868, isotype).

Comments — Macroscopically the species may be recognized by its glabrous basidioma in brown and cream tints (Ryvarden & Johansen 1980). The angular to elongated pores, duplex context with a greyish to blackish fibrous upper

layer, separated by a thin black line from the lower light-brown corky part, and obovoid, hyaline, thin-walled basidiospores support the identification. It constitutes a new record from Brazil.

Acknowledgments

The authors acknowledge Dr. Leif Ryvarden for identification of *Trametes cingulata* (SP393683). We are grateful to FAPESP (first author's fellowship process nº 2006/58786-6 and BIOTA thematic project process nº 2004/04820-3) for financial support. We also extend our thanks to Gerardo Lucio Robledo and Rosa Mara Borges da Silveira, who kindly reviewed the manuscript.

Literature cited

Abrahão MC, Gugliotta AM, Silva R, Fujieda RJY, Boscolo M, Gomes E. 2008. Ligninolytic activity from newly isolated basidiomycete strains and effect of these enzymes on the azo dye orange II decolourisation. Annals of Microbiology 58: 427–432.

Abrahão MC, Gugliotta AM, Gomes E. 2009. Poliporóides (*Basidiomycota*) em fragmentos de mata no perímetro urbano de São José do Rio Preto, São Paulo, Brasil. Revista Brasileira de Botânica 32: 427–440. http://dx.doi.org/10.1590/S0100-84042009000300004

Baltazar JM, Trierveiler-Pereira L, Ryvarden L, Loguercio-Leite C. 2010. *Inonotus* s.l. (*Hymenochaetales*) in the Brazilian herbaria FLOR and SP. Sydowia 62: 1–9.

Gilbert GS, Gorospe J, Ryvarden L. 2008. Host and habitat preferences of polypore fungi in Micronesian tropical flooded forests. Mycological Research 112: 674–680. http://dx.doi.org/10.1016/j.mycres.2007.11.009

Gilbertson RL, Ryvarden L. 1986. North American polypores. Synopsis Fungorum 1: 1–433.

Holmgren PK, Holmgren NH. 1998. Index Herbariorum: New York Botanical Garden's Virtual Herbarium. Available at: http://sweetgum.nybg.org/ih/Holmegren.

Kirk PM, Cannon PF, Minter DW, Stalpers J. 2008. Ainsworth & Bisby's dictionary of the fungi. 10th ed. Wallingford, CAB International. 771 p.

Kronka FJN. 2005. Inventário florestal da vegetação natural do Estado de São Paulo. São Paulo, Secretaria de Meio Ambiente/Instituto Florestal. 200 p.

Mata M, Ruiz-Boyer A, Carranza J, Ryvarden L. 2007. Nuevos registros de hongos poliporoides (*Basidiomycetes*) para Costa Rica. Boletin de la Sociedad Micológica de Madrid 31: 123–129.

Mittermeier RA, Myers N, Gil PR, Mittermeier CG. 1999. Hotspots: earth's biologically richest and endangered terrestrial ecoregions. Ciudad de Mexico, CEMEX/Agrupación Sierra Madre. 430 p.

Nalon MA, Mattos IFA, Franco GADC. 2008. Meio físico e aspectos da fragmentação vegetal. 15–21, in: Rodrigues RR, Bononi VLR (Orgs.). Diretrizes para a Conservação e Restauração da Biodiversidade no Estado de São Paulo. São Paulo, Instituto de Botânica.

Rajchenberg M. 1987. Type studies of *Polyporaceae* (*Aphyllophorales*) described by J. Rick. Nordic Journal of Botany 7: 553–568. http://dx.doi.org/10.1111/j.1756-1051.1987.tb02023.x

Ryvarden L. 1991. Genera of polypores. Nomenclature and taxonomy. Synopsis Fungorum 5: 1–363.

Ryvarden L. 2002. Studies in neotropical polypores 17. New neotropical *Inonotus* species. Synopsis Fungorum 15: 70–80.

Ryvarden L. 2004. Neotropical polypores. Part 1. Introduction, *Ganodermataceae* & *Hymenochaetaceae*. Synopsis Fungorum 19: 1–227.

Ryvarden L. 2005. The genus *Inonotus* – a synopsis. Synopsis Fungorum 21: 1–149.

Ryvarden L, Iturriaga T. 2001. Studies in neotropical polypores 9. A critical checklist of poroid fungi from Venezuela. Mycotaxon78: 393–405.

Ryvarden L, Johansen I. 1980. A preliminary flora of East Africa. Fungiflora: Oslo, 636p.

SOS Mata Atlântica, Instituto Nacional de Pesquisas Espaciais. 2009. Atlas dos remanescentes florestais da Mata Atlântica, Período 2000 a 2005. Available at: http://www.sosma.org.br.

Xavier AF, Bolzani BM, Jordão S. 2008. Unidades de conservação da natureza no Estado de São Paulo. 23–42, in: Rodrigues RR, Bononi VLR (Orgs.). Diretrizes para a Conservação e Restauração da Biodiversidade no Estado de São Paulo. São Paulo, Instituto de Botânica.

Xavier-Santos S. 2003. Isolamento, identificação e perfil enzimático de fungos decompositores de madeira da Estação Ecológica do Noroeste Paulista – São José do Rio Preto/Mirassol, SP. 222f. PhD Thesis (Ciências Biológicas, Microbiologia Aplicada), Universidade Estadual Paulista, Rio Claro.

Young AM, Fechner NA, Ryvarden L. 2004. A preliminary checklist and introductory notes on the macrofungi of Lamington National Park. Australasian Mycologist 23: 45–52.